



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

# THE INSECT ENEMIES OF POLYPOROID FUNGI

DR. HARRY B. WEISS

N. J. STATE DEPARTMENT OF AGRICULTURE

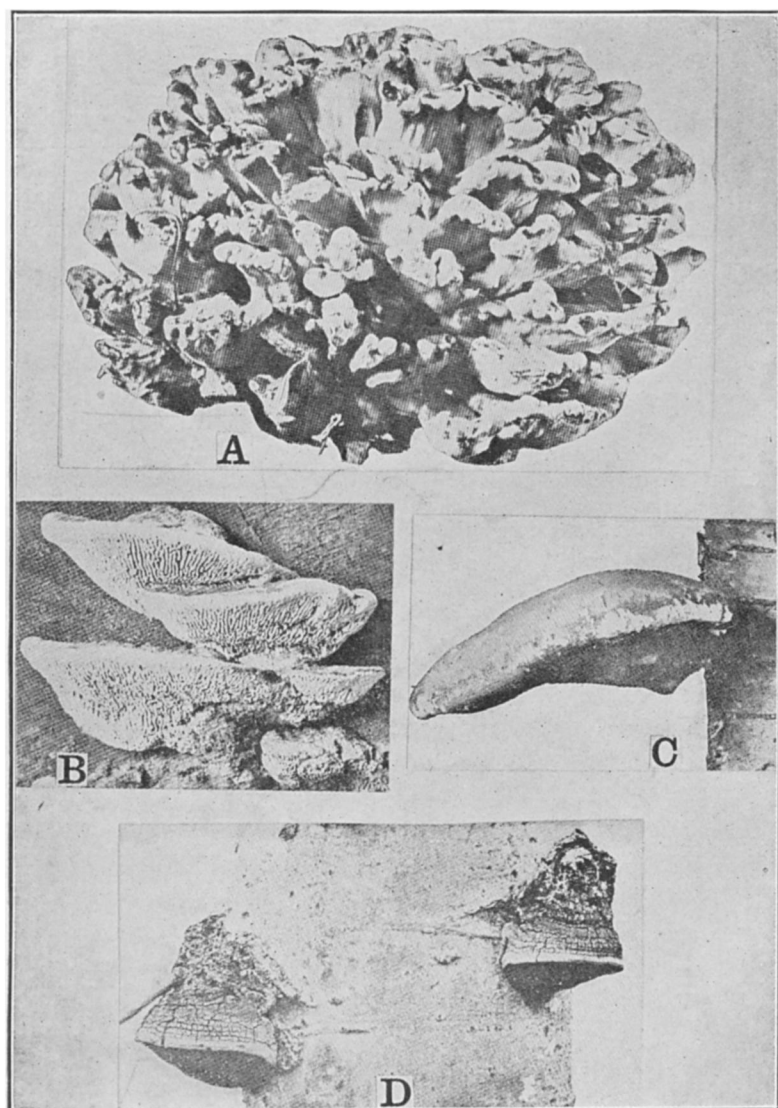
IN the past, entomologists have paid little or no attention to the fungus hosts from which they collected insects, and their captures are usually recorded as having been taken on or in a "fungus." This is a very indefinite term which includes a large number of species and gives no clue whatever as to the identity of the host. Years ago when mycologists were few and far between, it was undoubtedly difficult for entomologists to have the fungi identified but at present this excuse will no longer hold and there is no reason why such hosts should not be specified.

What appears to be a definite relationship between certain fungi or their fruiting bodies and insects has been observed in the past by both entomologists and mycologists. The spores of certain fungi were found to germinate in certain insect burrows and infection in some cases took place through insect apertures. In other cases, certain insects were observed to be present with certain fungi, both on a common host. Whether they acted together, independently, or followed each other in connection with the death of the host is a subject for further study.

The main object of this paper is to call attention to the different groups of insects which are found associated with polyporoid fungi and to urge that the hosts be recorded specifically or as near that as possible so that future workers will be in a position to digest the information intelligently after a large enough mass has accumulated. This paper is really a summary of the observations made during a year's collecting of fungus insects in New Jersey.

The *Polyporaceæ* includes those forms in which "the hymeneal surface is generally spread over the inner surfaces of pores or narrow tubes, sometimes over folds or shallow depressions between vein-like reticulations occasionally more or less lamelloid."<sup>1</sup> The sporophores vary considerably, are often very large and usually tough, and found chiefly on wood in the form of brackets of various sizes and shapes. The members of this family are found on both living and dead wood of deciduous and co-

<sup>1</sup> Duggar, B. M., "Fungous Diseases of Plants."



A. Fruiting bodies of *Polyporus sulphureus*.

B. Sporophores of *Dædalia quercina* on oak railroad tie; rarely attacked by insects.

C. Sporophore of *Polyporus betulinus* on birch.

D. Sporophores of *Fomes igniarius* on aspen.

(All figures after Von Schrenk and Spaulding, Bul. 149, U. S. D. A. Bur. Pl. Indus.)

niferous trees and as a class are very destructive to trees and timber.

New Jersey is not particularly rich in this group, only some 50 species having been found up to the present time and the state has been fairly well collected over. Many of these were taken in what is known as the Piedmont Plain section and while this area is largely under cultivation, it has many large swamp areas and the forests are deciduous. The Pine Barren section of the state was almost devoid of polypores and in the other sections they were found in carying numbers, depending on the size and location of the forested area. Several sections of the Piedmont Plain yielded the most and the species were by far more numerous here than in any of the other sections of the state.

Of the 50 different species of polypores collected 80 per cent. were found to be infested by insects, which were distributed as follows: Of a total number of 74 species, 59 belonged to the Coleoptera, 1 to the Hemiptera, 3 to the Lepidoptera, 5 to the Hymenoptera and 6 to the Diptera. Of the 6 species of Diptera, 2 were crane flies found associated with soft, watery polypores, 3 were fungus gnats and 1 was a member of the *Ortaliidæ*. All of the Hymenoptera were parasites of beetles. The 3 species of Lepidoptera belonged to the family *Tineidæ* and the one hemipteron was the flat bug *Aradus similis* found on *Polyporus betulinus* and *Fomes pinicola*. In the Coleoptera 17 families were represented, according to the following table:

#### COLEOPTERA ASSOCIATED WITH POLYPORES

Family	Number of Species Found on or in Polypores
Hydrophilidæ .....	1
Staphylinidæ .....	3
Scaphidiidæ .....	2
Erotylidæ .....	4
Mycetophagidæ .....	3
Dermostidæ .....	1
Histeridæ .....	3
Nitidulidæ .....	6
Trogositidæ .....	2
Ptinidæ .....	3
Bostrychidæ .....	1
Cisidæ .....	16
Scarabaeidæ .....	2
Tenebrionidæ .....	6
Melandryidæ .....	4
Mordellidæ .....	1
Anthribidæ .....	1

With the exception of the species belonging to the *Histeridæ* and part of the *Trogositidæ*, which are predaceous, it is extremely probable that most of the remainder are fungus eaters, as some were taken breeding in and others on or in the fungi. In addition to what might be called the fungus habit of some of the members of the above named families, it might be of interest to note other family habits in a general way and this can be presented best in a tabular form.

OTHER FAMILY HABITS OF COLEOPTERA FOUND IN POLYPORES

Family	General Habits of Members
Hydrophilidæ .....	Aquatic and terrestrial, found in moist earth, dung, decaying vegetation.
Staphylinidæ .....	Varied, predaceous, feeders on decayed vegetation.
Scaphidiidæ .....	Living in rotten wood, gill fungi.
Erotylidæ .....	In fungoid growths, stems of plants.
Mycetophagidæ .....	Under bark and in fungus.
Dermestidæ .....	On dry animal matter and vegetable products.
Histeridæ .....	Predaceous.
Nitidulidæ .....	Varied, sap beetles, in fungi or dry animal and vegetable matter.
Trogositidæ .....	Predaceous, a few in granaries, fungi.
Ptinidæ .....	On dry animal and vegetable products.
Bostrychidæ .....	In dry wood.
Cisidæ .....	In fungi or wood penetrated by fungi.
Scarabaeidæ .....	Varied, in excrement, decaying vegetation, etc.
Tenebrionidæ .....	Scavengers, on dead or dry wood, vegetable products, in granaries.
Melandryidæ .....	In dry vegetable matter.
Mordellidæ .....	On flowers, dead trees, in plant stems.
Anthribidæ .....	On dead wood, on fungi.

The members of the *Cisidæ* and *Mycetophagidæ* appear to be the only ones confined almost exclusively to fungi. It is quite probable, however, that such members of the other families as are listed as occurring under bark and in dead wood are feeders on the fungus hyphae which penetrate such places.

Many of the polypores, especially after they have matured, are dry, tough, woody or leathery, although some are soft and watery. In most cases the entire sporophore is consumed by the beetles and their larvæ, or so riddled that it weathers away rapidly. In many instances the partly eaten sporophore affords hibernation quarters for the larvæ or adults during the winter and food the next season until fresh fruiting bodies are produced.

Certain species of polypores appear to be more attractive to insects than others and the following table gives a list of the fungi, together with the numbers of insects in different orders found associated with each fungus.

## POLYPORES AND INSECTS FOUND ASSOCIATED WITH THEM

Fungus	Coleoptera No. Species	Lepidoptera No. Species	Diptera No. Species	Hemiptera No. Species	Total
<i>Polyporus squamosus</i> Hud. ....	1				1
" <i>brumalis</i> Pr. ....	1				1
" <i>betulinus</i> Bul. ....	8			1	9
" <i>berkleyi</i> Fr. ....	11				11
" <i>sulphureus</i> Bul. ....	2	1			3
" <i>fumosus</i> Per. ....	2				2
" <i>amorphus</i> Fr. ....	2				2
" <i>conchifer</i> Schw. ....	1				1
" <i>tulipiferus</i> Schw. ....		1			1
" <i>pargamenus</i> Fr. ....	3				3
" <i>versicolor</i> L. ....	23				23
" <i>hirsutus</i> Wf. ....	5		1		6
" <i>dichrous</i> Fr. ....	4		2		6
" <i>borealis</i> Fr. ....		1			1
" <i>chioneus</i> Fr. ....	2				2
" <i>albellus</i> Peck. ....	6		1		7
" <i>galactinus</i> Peck. ....	1				1
" <i>cinnabarinus</i> Jacq. ....	3				3
" <i>lucidus</i> Leys. ....	3		1		4
" <i>curtisi</i> Berk. ....	1				1
" <i>tsugæ</i> Mur. ....	3	1	1		5
" <i>graveolens</i> Schw. ....	1				1
" <i>hispidus</i> Bul. ....	1				1
" <i>gilvus</i> Schw. ....	10				10
" <i>cuticularis</i> Bul. ....	4				4
<i>Fomes pinicola</i> Swen. ....	1			1	2
" <i>bakeri</i> Mur. ....	1				1
" <i>fomentarius</i> L. ....	1				1
" <i>igniarius</i> L. ....	2	1			3
" <i>lobatus</i> Schw. ....	1				1
" <i>applanatus</i> Per. ....	3				3
" <i>marmoratus</i> ....	1				1
<i>Trametes suaveolens</i> L. ....	1				1
<i>Dædalia unicolor</i> Bul. ....	1				1
" <i>confragosa</i> Bol. ....	3				3
" <i>quercina</i> L. ....	1				1
<i>Lenzites betulina</i> L. ....	8	1	2		11
" <i>sepiaria</i> Fr. ....	2		1		3
<i>Poria</i> Sp. ....	2				2

From this table it will be seen that *Polyporus versicolor*, *Polyporus berkleyi*, *Polyporus betulinus*, *Polyporus gilvus* and *Lenzites betulina* are all insect favorites, especially *Polyporus versicolor* with 23 species to its credit. Just why these species are so attractive to the Coleoptera is a subject for further study. In fact any discussion at this time of the relationship between insects and fleshy fungi would be unwise on account of a lack of suitable data and the above material has been presented in the hope that it may stimulate interest in a subject which has long been neglected and which contains interesting and perhaps economic possibilities.